

**Patent Office  
Canberra**

I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PR 1311 for a patent by RMG SERVICES PTY. LTD. filed on 09 November 2000.

I further certify that pursuant to the provisions of Section 38(1) of the Patents Act 1990 a complete specification was filed on 08 November 2001 and it is an associated application to Provisional Application No. PR 1311 and has been allocated No. 89254/01.

WITNESS my hand this  
Fifteenth day of November 2001

LEANNE MYNOTT  
MANAGER EXAMINATION SUPPORT  
AND SALES

## Provisional Specification

• Invention Title

### COMPOSITE ELECTRODES FOR ELECTROLYTIC AND FUEL CELLS

The invention is described in the following statement

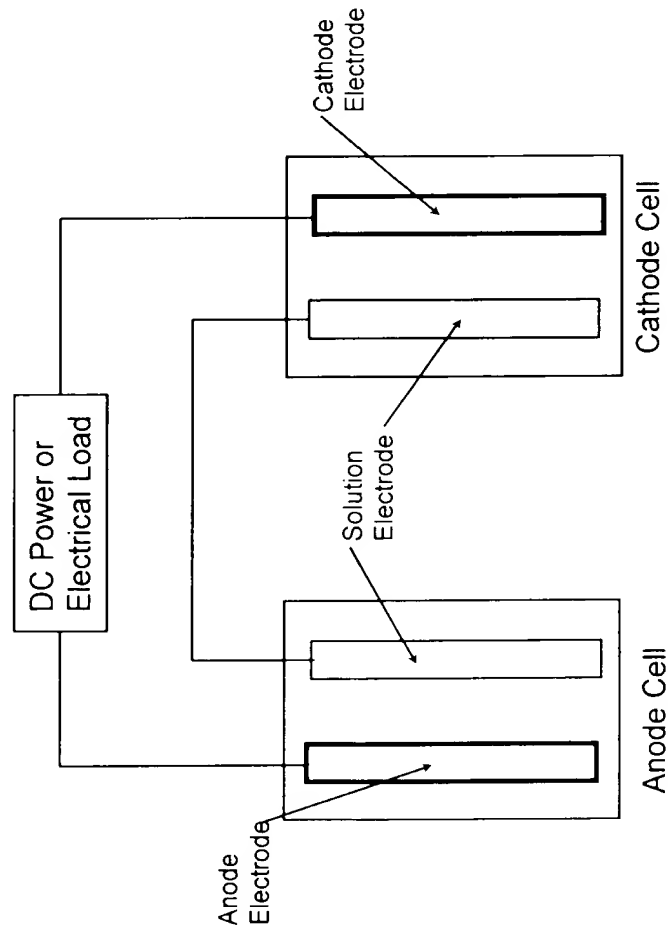
BACKGROUND: Our company has been granted Australian Patents 654774 and 707701 and US Patents 5,569,370 and 5,882,502 concerning a new concept electrochemical cell which does not use a diaphragm to function. Our company has also been granted Australian patent no. 714126 for a new concept fuel cell which operates without the use of a diaphragm or electrolytic membrane.

Figure 1A shows the placement of the anode and cathode electrodes with the solution electrodes as applied to the electrochemical cell and the fuel cell of the patents described above. Figure 1B is another arrangement of the anode, cathode and solution electrodes of the electrochemical cell and the fuel cell covered by the subject patents.

This patent application offers another means of achieving the functions of the above electrochemical cell and fuel cell without the use of a diaphragm or electrolytic membrane or proton electrolytic membrane between the anode electrode and the cathode electrode of the electrochemical cell or the fuel cell.

Figures 2A and 2B show the construction of the composite electrodes of this application. The sides and bottom of the sandwiched elements can be completely covered by a non-conducting material so that only the anode or cathode electrode surface are in contact with

**Fig. 1A: Electrode Placement for Electrochemical and Fuel Cell**



**Fig. 1B: Other Electrode Placement for Electrochemical and Fuel Cell**

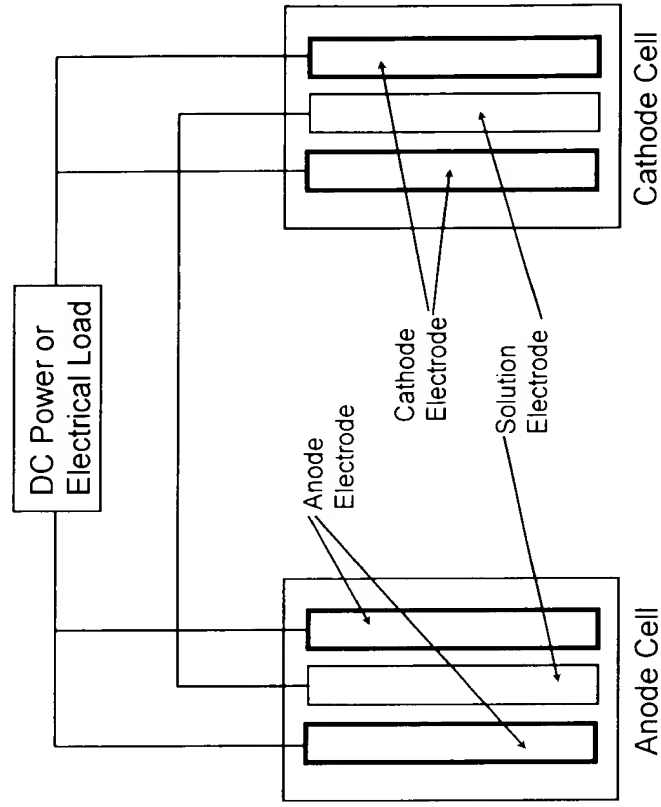


Fig. 2A: Anode Composite Electrode

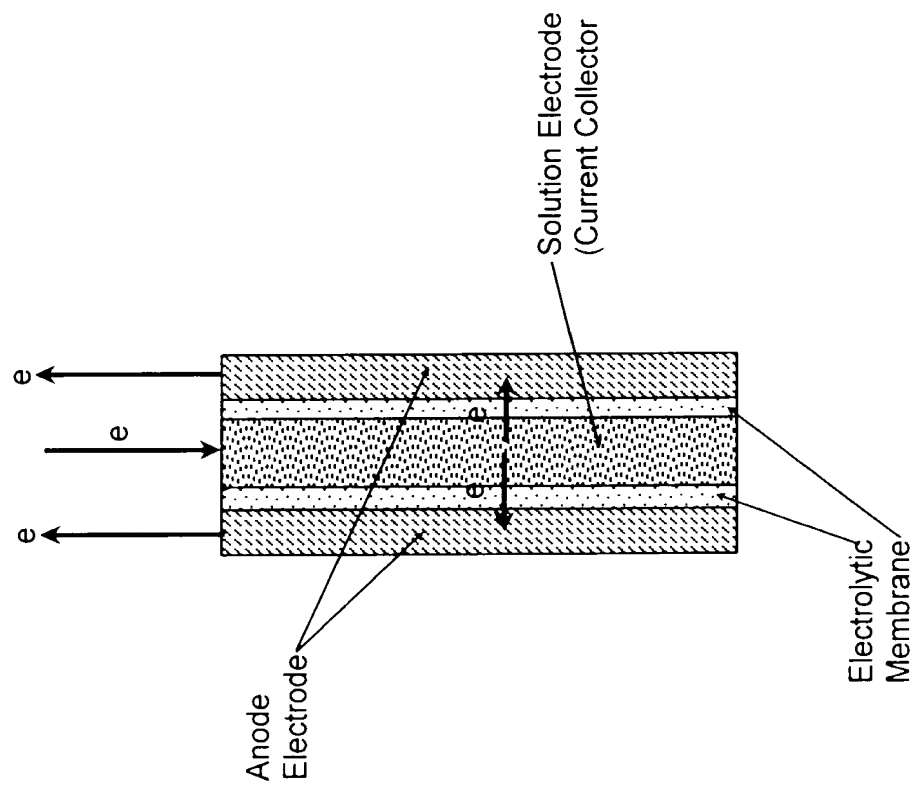
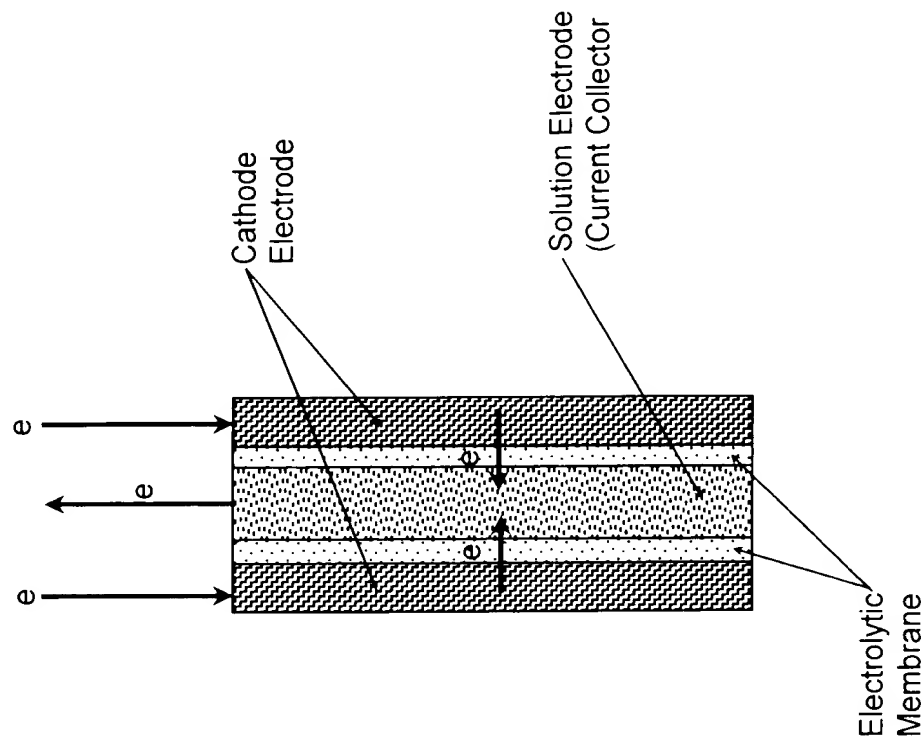
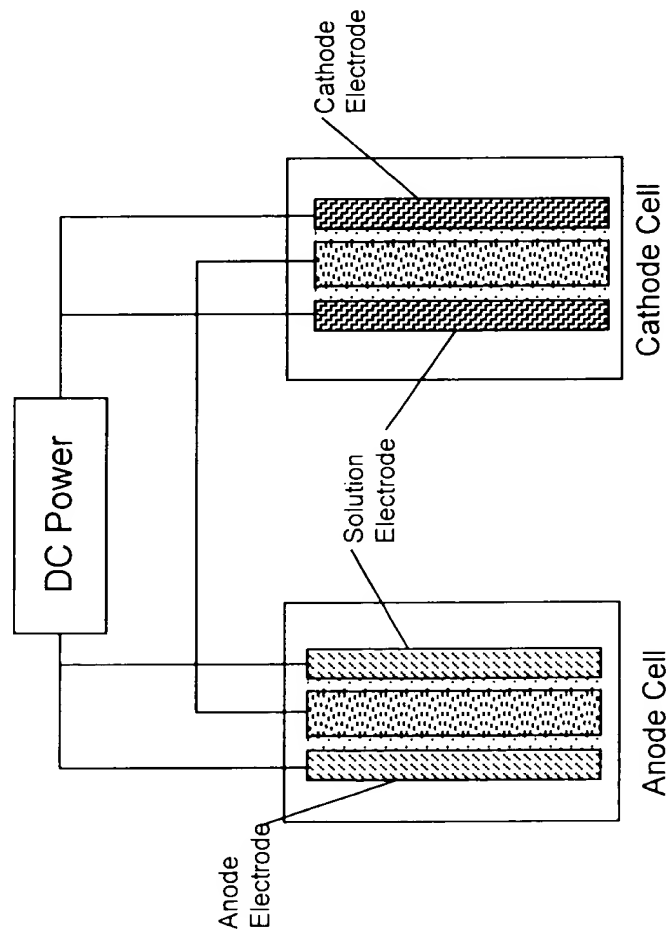


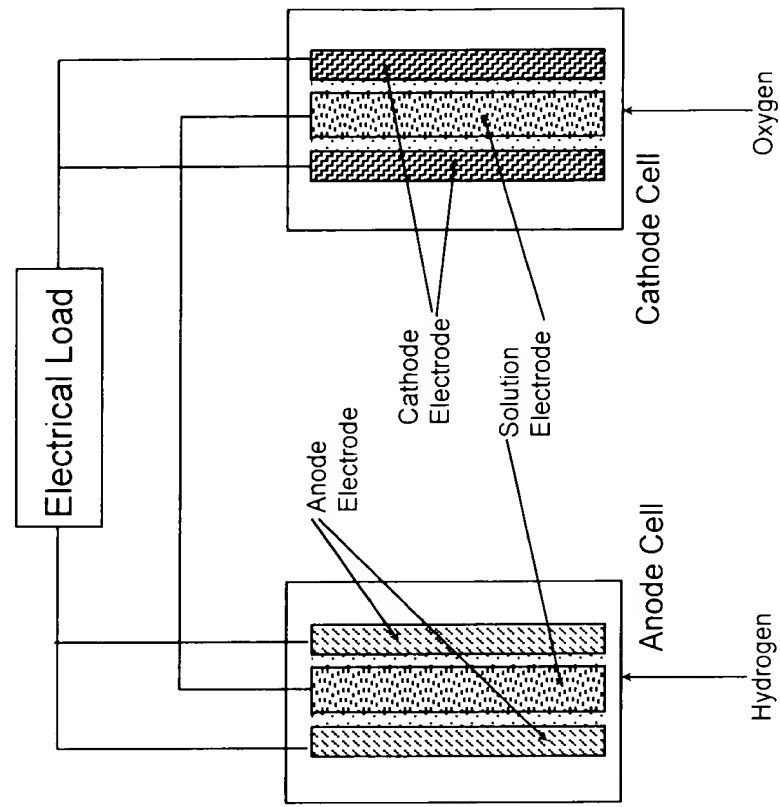
Fig. 2B: Cathode Composite Electrode



**Fig. 3A: Composite Electrode in an Electrochemical Cell**



**Fig. 3B: Composite Electrode in a Fuel Cell**



The invention is described in the following statement

the electrolyte. The solution electrode is sandwiched between two (2) proton electrolytic membranes which are in turn sandwiched by the anode electrodes or the cathode electrodes. The electrodes are immersed in the anode electrolyte or cathode electrolyte as shown on Figure 3A for the electrochemical cell.

In the electrochemical cell, the electrons are delivered to the cathode solutions at the surface of the cathode electrodes. The current travels through the cathode solution electrode and travel to the anode solution electrode. The electrons then travel through the anode electrode back to the DC power source.

For a fuel cell, the composite electrodes are located as shown on Figure 3B. Hydrogen fuel is catalysed at the surface of the anode electrode. The electrons travel to the Electrical Load and then to the cathode electrode where the electrons participate in the reaction with the oxygen at the surface of the cathode electrode. The electrons travel to the cathode solution electrode and then to the anode solution electrode then to the anode electrode to complete the electronic circuit.

The composite electrode can offer better performance in some applications of the electrochemical cell and the fuel cell than the open type embodiment of the solution electrode.

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09 / 11 / 2010

Date